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The University of Michigan

Center for Human Growth and Development

Comparisons of the Restricted Associations of Chronic Schizophrenic and Normal Control Subjects

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Comparisons of the Restricted Associations of Chronic Schizophrenic and Normal Control Subjects

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Most recent investigations of schizophrenic thought and speech have been descriptive in nature, concentrating on consistencies or inconsistencies in schizophrenic language as a function of experimental manipulations and generalizing these findings along dimensions of comparison with normal or other criterion groups (Payne, 1961; Buss and Lang, 1965ab; and Laffal, 1965). Schizophrenic language and conceptual behavior have been variously described as being concrete, overly generalized, abstract, over-inclusive, uncommon, idiosyncratic, dereistic, childlike, confabulated, repetitive, logically muddled, paralogical, paleological, susceptible to affective intrusion or involuntary and inappropriate shifts in attention or mental set, and in general non-communicative (cf. Buss and Lang, 1965ab). The most predominant finding throughout this large body of literature is the obvious implication that schizophrencis are, in fact, more deviant and disturbed than normals in all aspects of behavior, including language and conceptual behavior. A possible exception to this is the discussion of Freud's theory of language by Laffal (1964, 1965) which attempts to integrate a theory of language with clinically observed phenomena, but which appeared after the initial planning of this study.

In lieu of such a theory, a method developed by Riegel and Riegel (1963) may have potential value for the study of language and conceptual pathology. Starting from the viewpoint that associations are in some basic sense never free, they attempt to manipulate the degree of freedom of response of Ss by giving instructions to respond within some semantically or syntactically determined dimension of constraint. By studying the interdependence of these dimensions they try to "ascertain the conceptual structure underlying the associative behavior of various groups of Ss" (Riegel, 1965, p.1). This approach stresses relationships between associations as a function of task and S differences, and

is, thus, fundamentally different from the free-association technique of Jung (1919) which emphasized the content of an individual's stream of associations and which were thought to be unconsciously related as "complexes" of attached ideas and feelings.

This study attempts to apply restricted association techniques to assess and compare the relationships among syntactic and semantic categories in schizophrenic and non-schizophrenic Ss. Other studies using similar techniques have concentrated on preference for certain content categories or abstract or concrete meanings among groups (Milgram, 1961), associative interference in the form of bizarre, incorrect, or unshared responses among Ss (Chapman, 1958, 1961), and temporal relationships such as latency of response in disturbed and normal groups (Lester, 1960). Such studies have attempted to account for the variability of schizophrenic behavior within an empirical frame of reference, but aim at proving or disproving specific hypotheses such as those of verbal intrusion or interference, microgenesis of thought, over-inclusion vs. under-inclusion, etc. Buss and Lang (1965b) conclude that up to this point the range of tasks used to study deficit is not sufficient to sustain such broad hypothesis testing nor is the more general assumption that certain stimuli differ along certain dimensions (e.g., abstract-concrete) useful. In contrast, the present study while it may be interpreted as either supporting or rejecting specific theories of psychological deficit mentioned above, was designed to furnish some preliminary "normative" data on the associative behavior of schizophrenics without prejudging or hypothesizing about the specific form of the results.

The present study analyzes, in particular, the degree to which normals and schizophrenics agree in their responses to the restricted associates task, as well as the relative conceptual clarity, breadth, and differentiation of responses within each group. Earlier investigations of verbal associations (Rosanoff, Martin, and Rosanoff, 1918; Murphy, 1922) have yielded such conclusions as: (1) Disordered persons give a larger proportion of individual responses indicating that they are out of touch with normal discourse. (2) There are correlations in associative behavior among certain types of psychosis but no single logical type of association is typical of any diagnostic group or of

normals. (3) Since "the association method strikes chiefly at the crystallization of speech habits, which are little influenced by the disorders." (Murphy, 1922, p. 571), we should expect few differences in response to such a task between normals and schizophrenics (Hunt, 1931). These early viewpoints imply that associative responses are indicative of the strength and variety of verbal habits but not of the person's conceptual organization. Since this limitation does not hold for the methodology of restricted associations, we do not only expect to test the above propositions on individual and group differences in response, but also different patterns of responses among the normal and schizophrenic groups. If we can relate the dimensions of task complexity and restrictedness to such response patterns, a firmer basis for hypothesizing could be established than that which presently exists.

Method

Subjects: Ss were 24 male chronic schizophrenics and 24 hospital staff members (both ward and office personnel). Ss were equated for age (range 18-28) and level of education. In addition, no one with tested verbal I.Q. below 95 or who had not had some form of high school education was admitted to the sample. This selection procedure resulted in the exclusion of all but 38 Ss from an original group of 139 schizophrenics. Of these, 14 Ss were unable to complete the task because of emotional upset, motivational problems, or some reason of procedure or scheduling.

Stimuli: Forty stimuli, all nouns, were selected from the Michigan restricted association norms (Riegel, 1965). Thirteen words were of high frequency (>800), thirteen of intermediate frequency (200-800) and fourteen words were of low frequency (< 200) according to the Thorndike-Lorge word counts (1944). The stimuli were also selected so as to maintain a representative balance of content categories and with respect to their abstract of concrete qualities:

ANGER, ARM, BED, BIRD, BODY, BOY, BUILDING, BUTTERFLY, CAVE, CHEESE, COTTAGE, CRUST, DOOR, DREAM, FOOD, FOREIGNER, FURNITURE, GLUE, HEAD, JUSTICE, KNIFE, LEAF, LETTUCE, MAN, PATRIOT, ROAD, SCISSORS, SEX, SOCIALISM, SOLDIER, STAR, STOMACH, STOOL, STREAM, SUN, THIEF, TIGER, TOOL, TOWN, WORK.

Tasks: In the first session Ss were given a task of free word associations. In addition, eleven restricted association tasks of three varieties (logical, infralogical, grammatical -- see Table 1 for their identifications) were administered in the two sessions in random order: Five in the first and the remaining six in the second session. Total testing time for the Ss averaged about two and one-half hours. The following instructions were used:

> The following are tasks of restricted associations. You have received 6 (12) pages with 40 stimulus words on each page. On top of each page you will find particular instructions. These instructions will tell you what you are to write down on that page. Please read the instructions carefully to be sure you understand them before you write anything down.

Ss were instructed to make a single response to each stimulus under each of the twelve task conditions and to complete the tasks in the indicated order.

Free Associations:
Write the first word which comes to your mind after you read the stimulus word.

Superordinates:
Find a class-name for the stimulus. For instance, class names for FORK are: SILVERWARE or UTENSIL. Class names for LIMOUSINE are: CAR or VEHICLE.

Subordinates:
Find a word of that class which is denoted by the stimulus. For example, RAKE and PITCHFORK are in the class of FORKS. CONVERTIBLE and LIMOUSINE are in the class of CARS.

Similars:
Find a word that means essentially the same as the stimulus. For instance, RAKE or BRANCH may be regarded as similars to FORK. AUTO or AUTOMOBILE may be regarded as similars to CAR.

Contrasts:
Find a word that means essentially the opposite of the stimulus. For instance, KNIFE or SPOON may be regarded as contrasts to FORK. FOOLISHNESS or STUPIDITY may be regarded as contrasts to WISDOM.

Verbs:
Name the first verb which comes into your mind after reading the stimulus word. For instance, PIPE may make you think of the verbs: CARRY, SMOKE, or PLAY.

Adjectives:
Name the first adjective which comes into your mind after reading the stimulus word. For instance PIPE may make you think of the adjectives WOODEN, BEAUTIFUL, or MASCULINE.

Foregoing Words:
Find a word which often precedes the stimulus word in a sentence. For example, in the sentence "The plumber fixed the copper pipe" PLUMBER, FIXED and COPPER are foregoing words to PIPE.

Following Words:
Find a word which often follows the stimulus word in a sentence. For example in the sentence "The pipe belongs to her old father" FATHER, OLD, and BELONGS are following words to PIPE.

Locations:
Name the location of the stimulus. For instance, locations of FORK are: TABLE or KITCHEN. Locations for a CAR are: ROAD or GARAGE.

Parts:
Name an essential part or attribute of the stimulus. For instance, essential parts of a FORK are: the HANDLE or the METAL. Essential attributes of WISDOM are EXPERIENCE and MATURITY.

Succeedings:
Name something that frequently occurs after the stimulus. For example, PUDDLE and LAKE occur after RAIN. COLLEGE and UNIVERSITY occur after KINDERGARTEN.

Results and Discussion

Blanks: Ss' failure to respond can be indicative of his task attitude or his difficulty in following the instructions. Contrary to what might be expected, normal Ss failed to respond more frequently than schizophrenic Ss. As shown in Table 1, normals left about 4% blanks; schizophrenics less than 2%, per task. This finding may be due to some differences in the experimental conditions, however. Normal Ss were permitted to work on the tasks by themselves to insure their anonymity. Schizophrenic Ss worked under E's supervision so as to minimize the effects of distractability. This difference showed most strongly for the stimulus word, SEX. Both groups responded almost 100% of the time to the stimuli of the free association task. As instructional constraints are minimal in this type of task, the readiness of completion is not difficult to comprehend. Generally, the differences in the number of failures to respond does not seem large enough to prevent comparisons between groups.

Insert Table 1 about here

Variability of Responses: Response variability is expressed by Type-Token Ratios (number of different words over total number of words) and shown in Figure 1. The Type-Token Ratio (TTR) is relatively independent of the number of responses given but varies as a function of task restriction, stimulus characteristics (such as word frequency) and group differences.

Insert Figure 1 about here

Schizophrenic Ss have higher type-token ratios than normals on all tasks and for all stimulus frequencies. Using a three-way analysis of variance (Linquist, 1956), group differences accounted for most of the variation ($F = 202.00$, $p < .001$) while word and task differences were also highly significant ($F = 4.78$, $p < .001$ and $F = 9.04$, $p < .001$, respectively). Interaction effects were non-significant in all cases.

When we compare the TTR of our groups with those of three groups of college students using the same stimuli and tasks, the response patterns of the schizophrenics are more sharply delineated, (see Figure 1). One of the groups was a heterogeneous sample of 50 college students tested twice over a one-year interval to ascertain the stability of responses of the Michigan restricted association norms (Gekoski, 1965; Gekoski and Riegel, 1967). The other two groups were 24 college students, each selected on the basis of a criteria test for their creative potential (Riegel, Riegel and Levine, 1966). The correspondence of our normal group of Ss with the one-year stability group is quite high. On the average, the difference in TTR is less than .03 and in no case did the TTRs of this or any of the other groups from the college population reach the TTRs of the schizophrenic Ss. Yet the relative magnitudes of the TTRs as a function of tasks reveal striking similarities for all groups. Thus, while the schizophrenics have more heterogeneous response patterns than all others, including high-creative Ss, they respond differentially to the restrictions of the tasks. Perhaps, the high variability of schizophrenics' responses indicates that they are using less appropriate responses than normal Ss.

Response Sets. To ascertain which responses are inappropriate for a particular task, involves determination of the shared responses of schizophrenic and normal Ss. Before we turn to this analysis, we need to inquire whether the individualization of the responses of our schizophrenic Ss may be due to differences in response processes or response sets. Generally, we should expect with Deese that free associations are "the most nearly context-free of all the techniques of eliciting verbal responses to particular stimuli" (1966, p 42) and subsequently, should expect the largest response variability for free associations. However, former (Riegel and Zivian, 1967), as well as the present results, indicate that this expectation is seldom confirmed. The TTRs of our normal Ss for all tasks but Locations are higher -- sometimes much higher -- than the TTR for free associations. The TTRs for Superordinates, Similars and Contrasts are about equal to those for free associations. For the schizophrenics the TTR of free associations is the lowest in all cases. This results may be explained by the two-fold effectiveness of conceptual constraints.

First, greater conceptual constraint is imposed by the explicit instructions for the restricted than for the free association tasks, i.e. the set of possible responses is smaller in the former case. This argument is implied in Deese's statements. Second, Ss will differ in their implicit search for appropriate responses. If the external constraint is minimal, as for the free associations, Ss and, in particular, schizophrenic Ss, seem to impose the most severe internal constraint upon their search and responding. If, on the other hand, the external constraint is strong, as for the tasks to name Parts, Ss are exceedingly liberal in their choice of responses. Thus, explicit and implicit (or objective and subjective) sets seem to counteract one another, and, in a certain sense, Ss' reactions are never free. Schizophrenic Ss in particular, seem to overreact in this manner by either constraining their freedom of choice or liberalizing their restrictions. Further evidence for this interpretation will be given in the following section.

Group Overlap: The extent to which schizophrenic and normal Ss agree in their responses was investigated by comparing the response distributions for each task and stimulus between the two groups of Ss. Often identical responses will occur at different frequencies in the

two groups. As a rule, the lower of these two figures has been chosen and summed over stimuli. Expressed as a percentage, this index will be called minimum group overlap (MGO).

As shown in Figure 2, MGO is greater for free associations, than for the logical tasks, lower still for the infralogical tasks and lowest for the grammatical tasks. Thus, the greatest agreement between the two groups is obtained under the condition of minimal instructional set. However, when task sets are more than nominal and, in particular, when they contain a similarity-contrast dimension, high MGO is also obtained.

When comparing MGO of our two groups with that of the college students retested after one year, or with that between high and low creative Ss we find the MGO for the former to be far lower on all tasks than in either of the other two comparisons. Most remarkably, the amount of MGO on all tasks is nearly identical for the test-retest responses of the students and the two distinctively different groups of high and low creative Ss. As the TTRs have indicated that our normal Ss look very much like the college students, the present results emphasize that schizophrenic responses are both less variable within and more idiosyncratic between Ss than those of normal persons. In the past (Riegel and Riegel, 1963) a high TTR has been found to accompany low MGO. Our comparisons of the schizophrenic and normal groups support this finding. The interaction of MGO with variables such as word frequency and stimulus content was minimal.

Insert Figure 2 about here

Sums of Task Overlaps: When comparing the sums of task overlaps, we determine the degree to which the responses given by a S to any one task are identical to the responses given to the other eleven tasks, both individually and collectively. As shown in Table 1 these sums can be compared across groups for each of the twelve tasks.

For all tasks and stimuli, schizophrenic Ss show greater sums of task overlaps than normal Ss, ($F = 355.6$, $p < .01$). The sums are highest for free associations and for three of our four logical tasks (Superordinate, Subordinate, and Similars), but the differences between the group of tasks was not significant. As indicated by the ratios in Table 1,

the differences between the two groups of Ss are greatest for the grammatical and especially the infralogical tasks ($F = 6.29$ for the interaction between groups of Ss and tasks; $p < .05$). Riegel, Riegel, Smith, and Quarterman (1967) have shown that "the amount of response repetition is high for young as well as for less educated Ss and decreases with increased age and education" (p.). With Ss in this study balanced for age and education, this measure may tap the degree to which Ss can differentiate their responses or as Shakow (1963) might put it, "shift their set" as a function of different task instructions.

Free Associative Overlaps: The overlaps between free associations and the eleven types of restricted associations are of special interest. As shown in the last three columns of Table 1, free associative overlap is higher for schizophrenic than for normal Ss on all tasks of restricted associations ($F = 26.4$, $p < .01$) and the differences between the groups of tasks are significant ($F = 8.40$, $p < .05$). Schizophrenic Ss resemble low creative Ss whose responses to the logical tasks (but not to all the other tasks) overlap highly with their free associations. As noted before on the other measures, especially on response variability, schizophrenic Ss resemble more often the high rather than the low creative Ss.

The relative differences between our two groups, as depicted by the ratios shown in Table 1, are largest for Superordinates, i.e. for a task with one of the lowest TTRs. Thus when explicit response sets are relatively restrictive (as indicated by the low TTR), schizophrenics' responses become more like free associations, i.e. less restrictive. On the other hand, when the explicit response sets are relatively loose as for the Verb associations, schizophrenics' responses, much like those of the normals', are unlike free associations.

Generally, the higher free associative overlap for schizophrenic in comparison to normal Ss indicates that either their restricted associations are less well controlled and more likely to be affected by random fluctuations or that their free associations are more controlled than expected. As previously discussed, both interpretations are not incompatible in that they may depend on task differences. When the external constraint is high as for the logical tasks, Ss apply a relatively low degree of internal constraint, i.e. react "freely". When the external constraint is low, they increase their internal constraint.

Task Overlap Matrices: Our interpretation can be further explicated by studying the complete overlap matrices rather than the sums of overlaps of any one task with the remaining eleven. These coefficients represent the number of identical responses within each group of 24 Ss divided by the highest possible number of identical responses; i.e. 24. Schizophrenic Ss have higher task overlaps than normal Ss in all but six out of 66 cases. The strikingly similar patterns and degrees of overlap of three logical tasks are of special interest. Superordinate/Subordinate, Superordinate/Similar, and Subordinate/Similar overlap coefficients are for the schizophrenic Ss 28%, 24% and 27%, respectively, and for the normals, 29%, 24% and 23%.

The exceptional correspondence of the overlap coefficients of the three logical tasks between schizophrenic and normal Ss indicates that the structure of logical relations is not necessarily impaired in schizophrenia. When the external constraint is high (as for the logical tasks) and when -- as we have emphasized -- schizophrenic Ss reduce the amount of internal constraint, they are able to react much like normal persons. In most of the other task comparisons, however (60 out of 66), the overlap coefficients are higher for schizophrenic than for normal Ss, indicating lower degrees of conceptual clarity and response differentiations. Two of the six exceptions in which schizophrenics have lower overlaps than normals represent comparisons of syntagmatic relations between Verbs and Foregoing Words and Following Words. This result may indicate the maintenance of sentential verbal habits among schizophrenic Ss as noted by Murphy (1922).

Conceptual Dimensions: To further explore the nature of these differences in conceptual clarity and structure a Guttman multiple scalogram analysis was applied, using procedures perfected by Lingoes (1963). This method "involves selecting an item from the set to be analyzed, finding that item among the reamining items which is most like it and having the fewest errors, determining the number of errors between the candidate item and all of its predecessors, and, finally, applying a statistical test of significance to adjust item pairs," (Lingoes, p. 1). In our case the item is a task overlap score taken from the set of 66 such scores obtained by comparing each of the twelve tasks with all others.

The results of this analysis can be mapped as distances from tasks (points) to a point of origin along some dimension of best fit as shown in Figure 3.

Insert Figure 3 about here

The analysis yields two dimensions which are essentially the same for both the schizophrenic and the normal Ss. The dimension along the absissa is characterized by the logical tasks of Contrasts, Superordinates, Similars and Subordinates on one hand, and the grammatical tasks of Verbs, Foregoing Words, Following Words, and Adjectives, on the other. Both Contrasts and Verbs are more, and Adjectives are less characteristic of the first dimension for schizophrenic than for normal Ss.

For normals the dimension along the ordinate of Figure 3 seems to be a space-time dimension, characterized by the infralogical tasks of Locations (as well as Parts) on one hand, and Succeedings (as well as Adjectives and Contrasts), on the other. Locations also characterize one end of the dimension for schizophrenic Ss; the other end is represented by Adjectives and only secondarily by Succeedings as for the normals.

In general, both dimensions are equally well represented by both groups and, thus, the structure of cognitive classes seems to be nearly identical. However, differences are revealed again, in regard to the role of free associations. For normal Ss, the task of free associations is located at the central and neutral point, whereas for schizophrenic Ss free associations are closely related to the logical tasks of Superordinates, Subordinates and Similars. This result shows once more the effectiveness of some self-imposed constraint upon the free associative behavior of schizophrenic Ss. Perhaps then, the free associations of schizophrenics are not as loose or free as has been suggested in the various hypotheses about "overinclusion" but resemble logical tasks in terms of the cognitive control that schizophrenic Ss extend over them.

Conclusions

As suggested by Broen and Storms (1966), and Broen (1966), the response patterns of chronic schizophrenic Ss are the function of reduced hierarchical organization of response tendencies, rather than attention or set factors, such as distractability, narrowed range of observation of stimuli (Venables, 1964), or of "associative intrusions", i.e., responses not governed by the demands of stimuli, task, and experimental sets, but by idiosyncratic emotional and cognitive reactions (Shakow, 1963). Our analyses of restricted and free associations, while it certainly seems to favor interpretations in terms of multi-processes, indicates that looking at variation in response patterns in terms of general dimensions like over-inclusiveness, under-inclusiveness or hierarchic disorganization of associations, can lead to inaccurate and/or misleading statements as to what schizophrenics can conceptualize. Clearly both associative and non-associative factors are operative in such tests as ours, i.e. time variables as well as task variables, but a description of the associative factors in terms of reduced hierarchical organization of response tendencies or concreteness of responses is not appropriate as a description of our data. Rather than speaking in terms of response hierarchy alone, our interpretations are concerned with the specification of response availability as a function of whether the task is of sufficient inherent strength to minimize the effects of the pathological process as in the case of our logical tasks, and to what extent response availability to particular stimuli is determined by extra-task sets, as seems to be the case with the free associative responses.

The best single, descriptive terms for the linguistic behavior of schizophrenic Ss seems to be those of overreaction and counteraction. As our comparisons of various types of restricted and free associations have shown, associative behavior will be dependent, on one hand, on the number of possible responses available for any given stimulus under different restrictions. On the other hand, Ss reactions are dependent on implicit constraints e.g. his understanding and interpretation of the tasks and his attitude toward the tasks such as his degree of compulsiveness, his willingness to cooperate, etc. Our results have consistently shown that whenever the degree of external constraint is low, all Ss, to some

extent, but in particular schizophrenic Ss increase the self-imposed implicit constraint. Whenever the external constraint is high, schizophrenic Ss reduce internal constraint, thus, overreacting in comparison to normal Ss, and counteracting the experimental conditions.

Summary

The associative behavior of 24 chronic schizophrenics and 24 normal control Ss equated for age and educational level was investigated. Free and restricted associations were obtained to analyze the organizational aspects of associative behavior as well as the number of unique or common responses per task, response repetitions under different task instructions, and agreement in responses among both groups of Ss. The associations of schizophrenics were more variable than those of normal Ss especially on tasks which restricted most the choice of responses. The agreement in responding between normal and schizophrenic Ss was markedly lower when compared with that between high and low creative Ss or with one-year test-retest data. The repetition of responses given to the same stimuli under different instructions was markedly higher for schizophrenic than normal Ss, and thus, the degree of task and response differentiation was reduced. The restricted associations overlapped with free associations more markedly for schizophrenic than for normal Ss, but the general structure of a conceptual semantic space was about the same for both groups. It was argued that when explicit constraint in tasks of verbal associations is high, schizophrenic Ss (more than normals) impose a low degree of implicit constraint upon their verbal behavior; when the external constraint is low, they increase their implicit constraint.

References

Broen, W. E., Jr. Response disorganization and breadth of observation in schizophrenia. Psychol. Rev., 1966, 73, 579-585.

Broen, W. E., Jr. and Storms, L. H. Lawful disorganization: the process underlying a schizophrenic syndrome. Psychol. Rev., 1966, 73, 265-279.

Buss, A. H. and Lang, P. J. Psychological deficit in schizophrenia: I. Affect, reinforcement, and concept attainment. J. abnorm. Psychol., 1965a, 70, 2-24.

Buss, A. H. and Lang, P. J. Psychological deficit in schizophrenia: II. Interference and activation. J. abnorm. Psychol., 1965b, 70, 77-106.

Chapman, L. J. Intrusion of associative responses into schizophrenic conceptual performance. J. abnorm. soc. Psychol., 1958, 56, 374-379.

Chapman, L. J. A reinterpretation of some pathological disturbances in conceptual breadth. J. abnorm. soc. Psychol., 1961, 63, 540-545.

Deese, J. The structure of associations in language and thought. Baltimore, Md.: Johns Hopkins Press, 1966.

Gekoski, W. L. An investigation of one-year reliability of the Michigan restricted association norms. Rep. No. 6, USPHS Grant MH 07619, Dept. Psychol., Univ. Michigan, 1965.

Gekoski, W. L. and Riegel, K. F. A study of the one-year stability of the Michigan free and restricted association norms. Psychon. Sci., 1967, 8, 427-428.

Hunt, J. McV. Psychological experiments with disordered persons. Psychol. Bull., 1931, 33, 33-34.

Jung, C. G. Studies in word association. New York: Moffat Yard, 1919.

Laffal, J. Freud's theory of language. Psychoanal. Quart., 1964, 33, 157-175.

Laffal, J. Pathological and normal language. New York: Atherton, 1965.

Lester, J. R. Production of associative sequences in schizophrenia and chronic brain syndrome. J. abnorm. soc. Psychol., 1960, 60, 225-233.

Lindquist, E. F. Design and analysis of experiments in psychology and education. Boston: Houghton Mifflin, 1956.

Lingoes, J. Multiple scalogram analysis: A set theoretic model for analyzing dichotomous items. Educ. psychol. Measurm., 1963, 23, 501-524.

Milgram, N. A. Microgenetic analysis of word associations in schizophrenic and brain-damaged patients. J. abnorm. soc. Psychol., 1961, 62, 364-366.

Murphy, G. Types of word associations in dementia praecox, manic depressives, and normal persons. Amer. J. Psychiat., 1922, 2, 539-571.

Payne, R. W. Cognitive abnormalities. In Eysenck, H. J. (Ed.) Handbook of abnormal psychology. New York: Basic Books, 1961, pp. 193-261.

Riegel, K. F. The Michigan restricted association norms. Rep. No. 3, USPHS Grant MH 07619, Dept. Psychology, Univer. Michigan, 1965.

Riegel, K. F. and Riegel, Ruth M. An investigation into the denotative aspects of word meaning. Lang. Speech, 1963, 6, 5-21.

Riegel, K. F., Riegel, Ruth M. and Levine, R. S. An analysis of associative behavior and creativity. J. Pers. soc. Psychol., 1966, 4, 50-56.

Riegel, K. F., Riegel, Ruth M., Smith Helen E. and Quarterman, Carole J. An analysis of differences in word meaning and semantic structure between four educational levels. Human Develpm., 1967, (in press).

Riegel, K. F. and Zivian, Irina W.-M. A study of inter- and intralingual associations in English and German. Rep. No. 15, USPHS Grant HD 01368, Center Human Growth Dev., Univer. Michigan, 1967.

Rosanoff, A. J., Martin, H. E. and Rosanoff, I. R. A higher scale of mental measurements and its application to cases of insanity. Psychol. Monog., 1918, 25, No. 109.

Shakow, D. Psychological deficit in schizophrenia. Behav. Sci., 1963, 8, 275-305.

Thorndike, E. L. and Lorge, I. The teacher's word book of 30,000 words. New York: Columbia Univ. Teachers College Press, 1944.

Venables, P. H. Input dysfunction in schizophrenia. In B. A. Maher (Ed.) Progress in experimental personality research, Vol. 1. New York: Academic Press, 1964, Pp. 1-47.

Table 1

Blanks, Variability, and Overlap Coefficients

Tasks	% Blanks		% Sums Task Overlaps			% Free Assoc. Overlaps		
	Schiz.	Normal	Schiz.	Normal	Ratio	Schiz.	Normal	Ratio
Free	.1	.3	51	33	1.7			
Logical (Aver.)	2.2	6.4	47	28	1.7	17	11	1.5
Superordinates	2.2	8.8	52	29	1.8	19	08	2.4
Subordinates	2.0	5.5	53	34	1.5	17	12	1.4
Similars	2.4	5.2	51	32	1.6	19	12	1.6
Contrasts	2.2	5.9	31	18	1.7	14	12	1.2
Grammatical (Aver.)	1.3	3.9	39	15	2.6	12	08	1.5
Verbs	1.7	2.4	33	15	2.2	08	07	1.1
Adjectives	.9	4.1	34	10	3.4	11	07	1.6
Foregoing Wds.	1.3	8.0	43	15	2.9	11	08	1.4
Following Wds.	1.5	1.0	46	19	2.4	16	09	1.8
Infralogical (Aver.)	1.9	3.3	44	14	3.1	13	09	1.4
Locations	1.5	1.1	40	11	3.6	12	10	1.2
Parts	2.3	3.6	46	13	3.5	13	07	1.9
Succeedings	1.9	5.1	45	18	2.5	15	09	1.7
Total (Aver.)	1.7	4.2	44	21	2.3	14	09	1.6

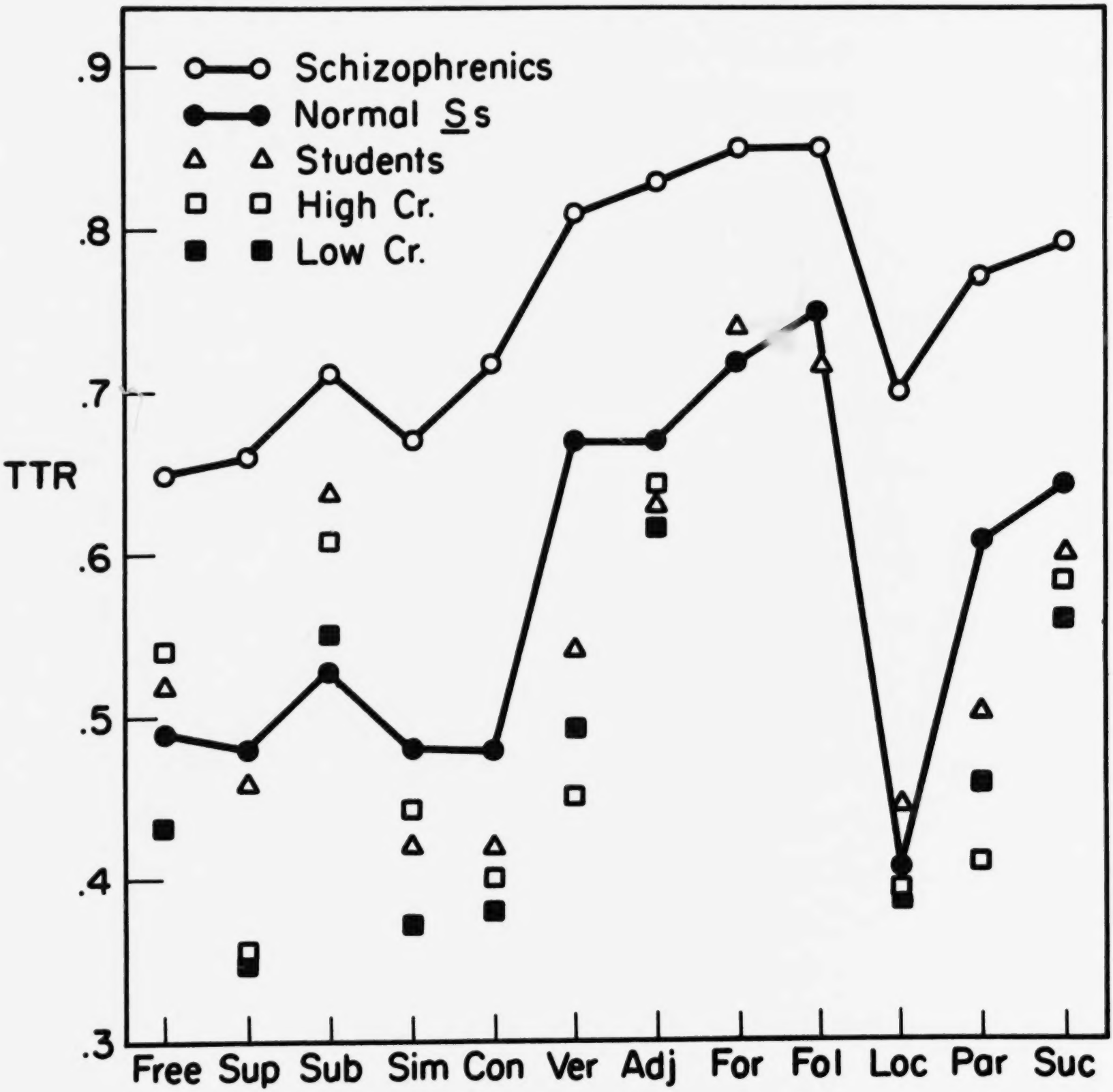

Fig. 1. Type Token Ratios for Twelve Tasks of Restricted Associations and Five Groups of Subjects.

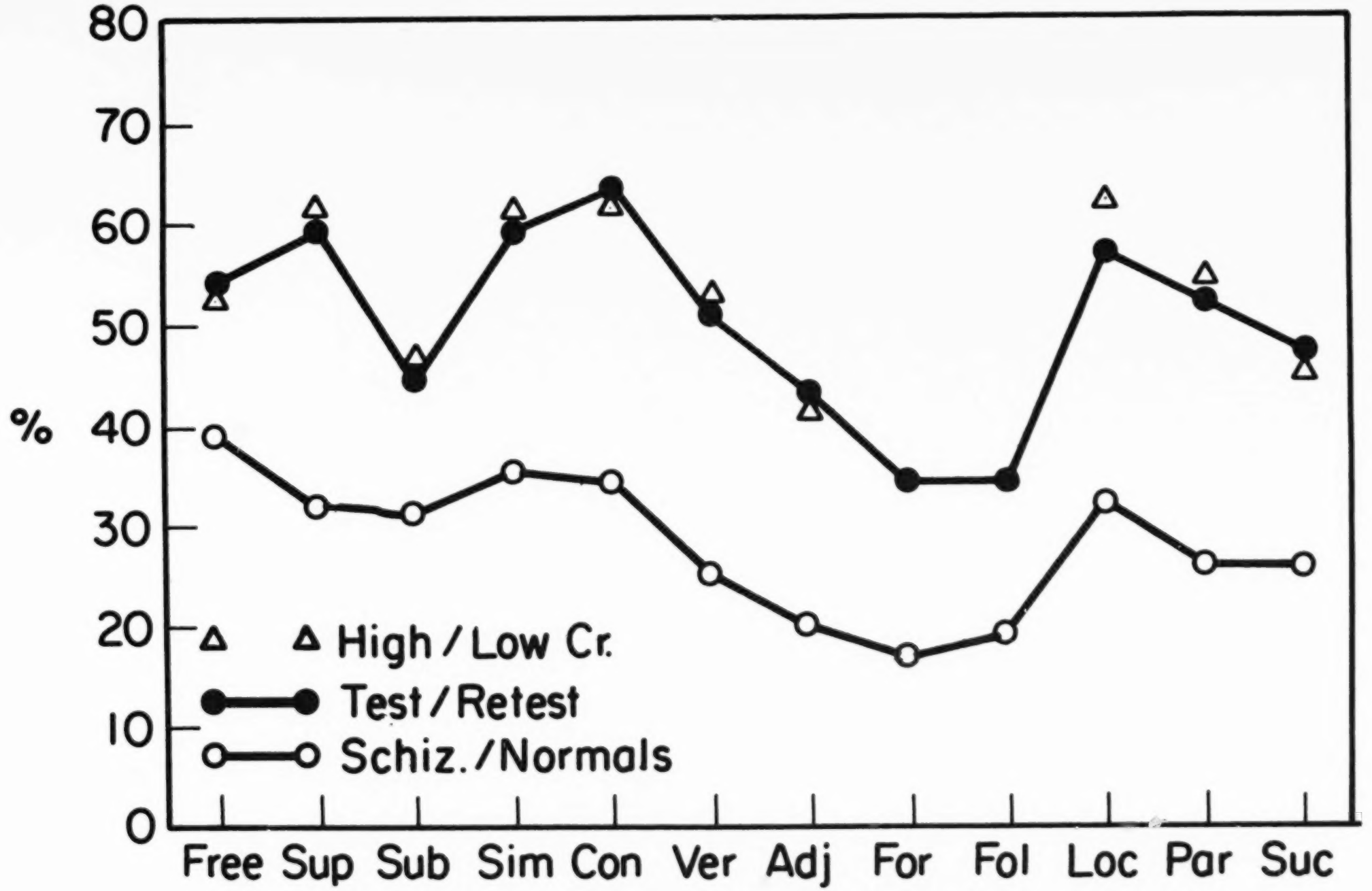

Fig. 2. Minimum Group Overlaps (MGO) for Twelve Tasks of Restricted Associations and Three Pairs of Groups.

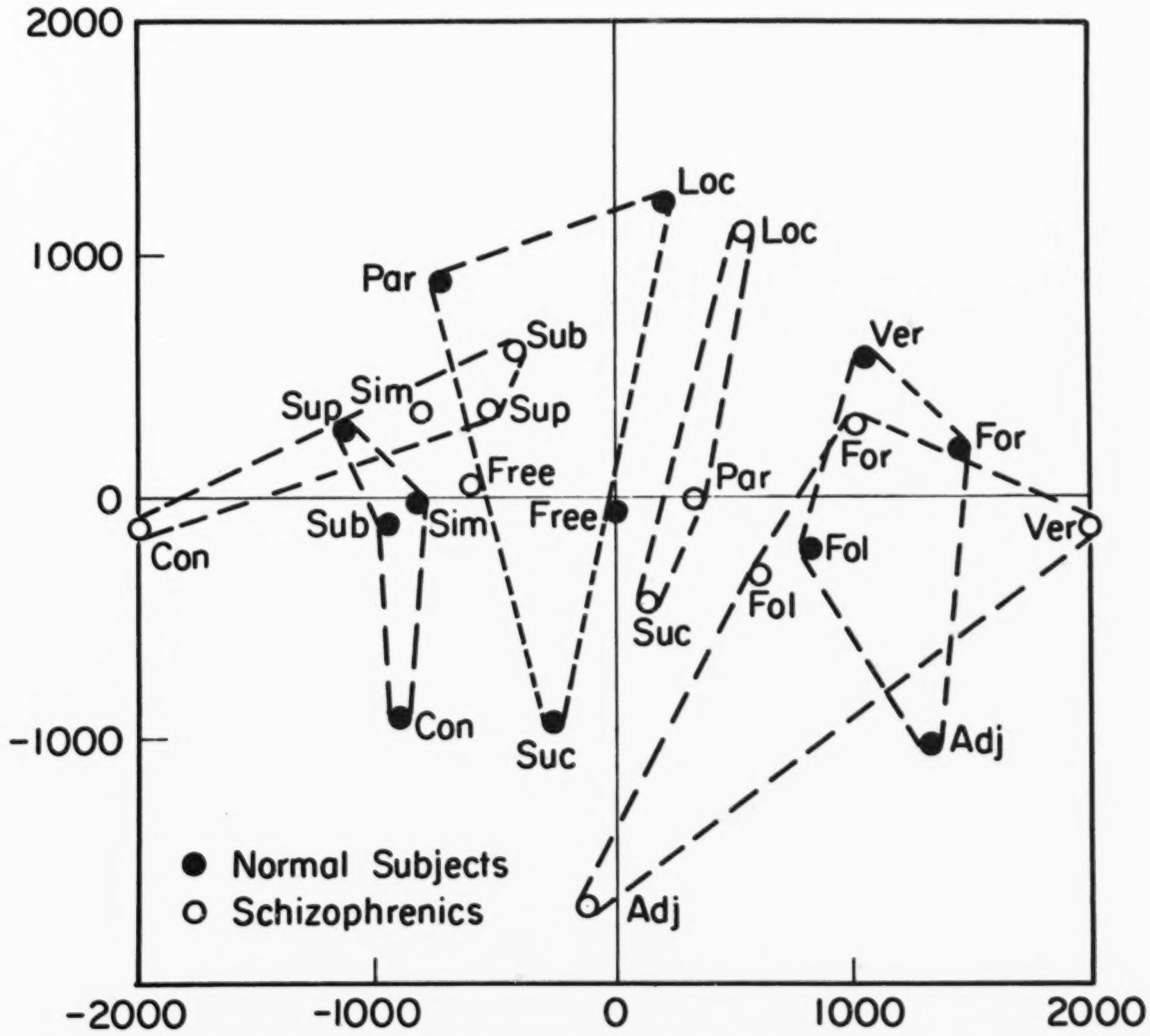

Fig. 3. Multiple Scalogram Analysis of Twelve Tasks of Restricted Associations and Two Groups of Subjects.